Journal of Automata, Languages and Combinatorics 8 (2003) 2, 187–218

WEAK BISIMULATION FOR (max /+) AUTOMATA AND RELATED MODELS [1]

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ABSTRACT

In this paper we propose a notion of weak bisimulation for a class of weighted automata with unobservable transitions where weights are taken from an idempotent semiring. In particular the (max/+), (min/+) or (max/min) dioid are considered. The proposed bisimulation is a natural extension of Milner's well known weak bisimulation for untimed automata (i. e., weighted automata over the boolean semiring). It is shown that weakly equivalent automata yield identical results with respect to the weights of arbitrarily labelled paths. The basic steps of an algorithm for the computation of the largest weak bisimulation relation for a given weighted automaton is outlined. Furthermore we present composition operations for weighted automata and prove that weak bisimulation is a congruence according to the composition operations presented in this paper.

Keywords: Weighted automata, dioids, weak bisimulation, composition

1. Introduction

One topic of automata theory considers conditions, criteria and circumstances under which two automata can be considered equivalent. For instance, observing the behaviour of an automata and to compare the traces or languages produced is one possibility. In case of an interacting environment, more appropriate notions of equivalence than trace-equivalence are necessary and established. Milner's classical results consider strong and weak bisimulation in the context of the process algebra CCS

[1] Full version of a lecture presented at the Workshop *Weighted Automata: Theory and Applications* (Dresden University of Technology, Germany, March 4 – 8, 2002).

[2] This research is partially supported by DFG, SFB 358.

[3] This research is partially supported by DFG, SFB 559.